PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2004/011529	04.08.2004	11.08.2003

International Patent Classification (IPC) or both national classification and IPC
G01N27/414, H01L29/772

Applicant
CANON KABUSHIKI KAISHA

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/011529

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was field, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/011529

Box No. II Priority

1. ☒ The following document has not been furnished:

   ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

   ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

   Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-11
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations

   see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

   and / or

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

   see form 210

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

1. The following document is referred to in this communication:

   D1: PATENT ABSTRACTS OF JAPAN vol. 0123, no. 29 (P-754), 7 September 1988 (1988-09-07) & JP 63 090754 A (TOSHIBA CORP), 21 April 1988 (1988-04-21)
   D2: US-A-5 874 047 (FROHNHOFF STEPHAN ET AL) 23 February 1999 (1999-02-23)
   D3: US 2003/020060 A1 (DEN TOHRU ET AL) 30 January 2003 (2003-01-30)

2. The invention relates to a field effect transistor (FET) with an insulating layer on the gate region and a porous film (made of a semiconductor material) located on the insulating layer.
   Such a FET is known in the art, cf. e.g. D1, porous insulating film 23 on insulating layer 21, 22.
   The subject-matter of the invention differs over the known prior art in the particular form of the pores, that are pillar-shaped (and perpendicular to the substrate).
   The subject-matter of claim 1 and 2 is thus novel (Art. 33(2) PCT).

   The technical problem to be solved by this feature is to improve the response time of the device when used as a sensor (cf. description, p.8, ll.13-18).

   Document D2 discloses a FET (fig. 3) with a porous silicon layer that has pillar-shaped holes; however, these holes also show additional branches perpendicular to the pillar-shaped holes, such branches leading away from a solution of the technical problem. Moreover, the porous layer is a projection from the substrate, i.e. there is no insulating layer in between. The skilled man, starting from D1 and looking for a solution to the technical problem would thus not consider D2 because it relates to a different structure and does not offer a solution to the technical problem.

   Document D3, by the same applicant, discloses a layer of pillar-shaped nanopores. However, though sensor applications are generically mentioned (§ 32), there is no suggestion that this structure could be used in a FET. Moreover, with respect to claim 1 of the application, it is noted that the structure according to D3 is made of alumina, and not of a semiconducting material, and with respect to

claim 2 of the application, that it is obtained by anodic oxidation.

The subject-matter of claims 1 and 2 does thus involve an inventive step (Art. 33(3) PCT).

3. Claims 2-10 are dependent on claim 1 or 2 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

4. Claim 11 relates to a method of producing a FET according to claims 1 or 2, and is thus also considered to be novel and inventive.

Re Item VII.

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Re Item VIII.

1. Although claims 1 and 2 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

2. Both in claim 1 and 2 it is not clear where the insulating substrate is located.

3. The second part of claim 2 relates to a method of producing the layer rather than to the technical features of the layer itself. Moreover, the wording of the claim is quite unclear:
   i. "through an insulating layer on a substrate" can give the impression that the pores pass through the insulating layer as well, which is not the case;
   ii. ll.15-19 are syntactically rather obscure and could be understood only in view of the description and corresponding examples.

4. In claim 7, l.11, as well as in several passages of the description, it appears that the word "detected material" be wrong.

5. The wording of claim 10 is not clear because it leaves the reader in doubt whether a sensor or its use is being claimed.
Moreover, it is not clear which technical features distinguish the sensor over the FET of claim 1 or 2, since such features are not mentioned in the claim.

6. The objection under point 3.ii above applies also to the subject-matter of claim 11 and to several passages of the description